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10/797,661

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EXAMINER

SCHECHTER, ANDREW M

ART UNIT

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2871

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

| | | | |
|------------------------------|--------------------------------------|------------------------------------|--|
| Office Action Summary | Application No. 10/797,661 | Applicant(s) HIRUMA, KEI | |
| | Examiner ANDREW SCHECHTER | Art Unit 2871 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 March 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 16, 17, 20, 22, 27 and 28 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 16, 17 and 27 is/are allowed.
- 6) ☒ Claim(s) 20, 22 and 28 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10 March 2004 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. Applicant's arguments filed 24 March 2008 have been fully considered but they are not persuasive.

The applicant has amended claim 16 to recite "discharging the liquid droplets from the nozzles such that: each of the liquid droplets has said weight; thereby, the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of the plurality of pixel regions, to coat each of the plurality of pixel regions with the liquid droplets having a joined portion therebetween; and the joined portion of the liquid droplets is located at a boundary of the pixel regions." As discussed in the office actions of 13 July 2007 and 28 December 2007, the word "thereby" requires the method to have the diameter determined by the act of discharging the droplets such that they have the said weight, rather than being due to other features such as the recessed portions in *Hsieh*, for instance. Therefore, this amendment patentably distinguishes the method of claim 16 from the prior art.

Regarding claim 20, reciting a liquid crystal discharging device, the applicant argues [p. 7-8] that there is no "joined portion" in *Masazumi*. This is correct, but not relevant. As stated in the rejection [p. 6 of the office action of 28 December 2007], this is a limitation on the intended use of the device; since the device disclosed by the prior art is capable of performing this function, the limitation does not distinguish the claimed device over the prior art.

The applicant argues [p. 10] regarding this "intended use" position that the feature is not executed by a user but instead by the controller. In the opinion of the examiner, this is not persuasive because the claim language does not make it clear that the features relied upon for patentability by the applicant are automatically carried out by the controller, without the intervention of a user, and are therefore structural limitations of the discharging device rather than functional intended-use limitations. In the rejection below, the examiner has carefully parsed the claim language to indicate his understanding of which claim limitations belong in each group.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 20, 22, and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Masazumi et al.*, U.S. Patent No. 6,331,884 in view of *Hashizume et al.*, US 2002/0062787 and further in view of *Yamamoto et al.*, Japanese Patent Document No. 09-138410.

Masazumi discloses [see Fig. 5, for instance] a liquid crystal discharging device comprising a discharge unit for discharging liquid crystals to arrange the liquid crystals on a substrate on which a plurality of pixel regions composed of a plurality of pixels are

formed, the discharge unit including a plurality of nozzles [N2, N3, N4] for discharging the liquid crystals [9a, 9a', 9a''] in a form of liquid droplets.

Masazumi does not disclose the structural limitation of a weight measurement device which measures a weight of a single liquid droplet. *Hashizumi* discloses [see paragraphs 0103-0104, for instance] an analogous discharge unit with a weight measurement device [54] which measures a weight of the single liquid droplet, enabling the discharge unit to discharge the liquid droplets from the nozzles such that each of the liquid droplets has said weight. It would have been obvious to one of ordinary skill in the art at the time of the invention to have such a weight measurement device, motivated by the teaching of *Hashizumi* that this allows the drop sizes to be constant, despite environmental (or other) changes during the processing.

Masazumi does not appear to explicitly disclose the structural limitation of a controller that controls an interval between the liquid droplets discharged from the nozzles, with the controller making the discharge unit discharge the liquid droplets from the nozzles. However, in order to function, the device must have such a controller, controlling the motion of the nozzles relative to the substrate and the rate of discharge of droplets.

In the opinion of the examiner, the remaining claim limitations are functional limitations related to the intended use of the discharging device, rather than structural limitations of the device.

First, the claim recites that the interval is based on a diameter of liquid droplets after impact of the liquid droplets on the substrate, which was measured in advance.

Art Unit: 2871

This is an intended-use limitation, in that a device having this structure could be used to discharge liquid droplets in this manner. Regardless of this being an intended-use limitation, the examiner notes that *Yamamoto* teaches [see Fig. 7] that when using an ink-jet/nozzle technique, the diameter of the liquid droplets after impact of the liquid droplets on the substrate should be considered, since having droplets too far apart [as in Fig. 7b] leads to separated droplets on the substrate and an uneven coverage of the substrate, for instance. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use a method in which an arrangement pitch of the liquid droplets is determined based on a diameter of the liquid droplets after impact on the substrate, which would have to be measured in advance (or the teaching could not be applied).

Second, the claim recites that the liquid droplets have the following properties when discharged: each of the liquid droplets has the said weight; and thereby, the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of the plurality of pixel regions, to coat each of the plurality of pixel regions with the liquid droplets, having a joined portion therebetween; and the joined portion of the liquid droplets is located at a boundary of the pixel regions. This is not a structural limitation of the device, but rather a description of the droplets discharged by the device. The recitation that "the controller makes said discharge unit discharge the liquid droplets from the nozzles such that..." does not overcome this difficulty by requiring the controller to have particular structural features, since if a user were to intervene to

instruct the device to produce such droplets, the controller would then blindly carry out exactly the recited limitation.

Regarding whether the above device based on *Masazumi* would be capable of carrying out these limitations, *Masazumi* discloses that the liquid crystal arrangement device discharges the liquid droplets from the nozzles such that each of the liquid droplets has a certain amount and the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of the plurality of pixel regions [see Fig. 1B; note that since the resin 9b constitutes a non-display area, it will have a small size relative to the pixel display area, so the diameter will be “roughly equal” to arrangement pitch, within the scope of how the examiner understands that relative term; also note that the resin does not act to define the placement of the liquid crystal as the recessed portions in *Hsieh* do], to coat each of the plurality of pixel regions with the liquid droplets. It therefore appears quite reasonable that the above device would be capable of carrying out the intended-use limitations if so directed.

Claim 20 is therefore unpatentable.

Like the existence of a controller, a drive system for moving the nozzles and the substrate relative to each other and aligning each impact location of the liquid droplets with each location of the pixel regions would be necessary for the device to function.

Claim 22 is therefore unpatentable.

Masazumi does not disclose that the arrangement pitch is obtained by selecting a subset of the nozzles having a pitch therebetween equal to the arrangement pitch, among the plural nozzles. The examiner takes official notice that ink-jet heads having a

Art Unit: 2871

plurality of nozzles, with only a subset of nozzles being activated at a given instant, are well-known in the art [this assertion was not traversed by the applicant, so it is now considered admitted prior art, see MPEP 2144.03]. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so, motivated by the desire to have the flexibility to use an available nozzle head and selecting a subset of its nozzles having the desired arrangement pitch, rather than having to obtain a specially designed nozzle head having its nozzle arrangement matching the pixel arrangement (which can vary for different devices which would beneficially be manufactured using the same equipment). The controller would thereby control the interval by selecting the nozzles having a pitch therebetween equal to the arrangement pitch, among the plural nozzles. Claim 28 is therefore unpatentable.

4. Claims 20 and 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over *Hsieh et al.*, U.S. Patent No. 6,867,840 in view of *Hashizume et al.*, US 2002/0062787 and further in view of *Yamamoto et al.*, Japanese Patent Document No. 09-138410.

Considering claim 20, *Hsieh* discloses [see Figs. 3E and 7, for instance] a liquid crystal discharging device comprising a discharge unit for discharging liquid crystal [170] to arrange the liquid crystal on a substrate [100] on which a plurality of pixel regions composed of a plurality of pixels are formed, the discharge unit comprising a plurality of nozzles which discharge liquid crystal in a form of liquid droplets, with each of the plurality of pixel regions being coated with the liquid droplets.

Hsieh does not disclose the structural limitation of a weight measurement device which measures a weight of the single liquid droplet. *Hashizumi* discloses [see paragraphs 0103-0104, for instance] an analogous discharge unit with a weight measurement device [54] which measures a weight of the single liquid droplet, enabling the discharge unit to discharge the liquid droplets from the nozzles such that each of the liquid droplets has said weight. It would have been obvious to one of ordinary skill in the art at the time of the invention to have such a weight measurement device, motivated by the teaching of *Hashizumi* that this allows the drop sizes to be constant, despite environmental (or other) changes during the processing.

Hsieh also does not necessarily explicitly disclose the structural limitation that there is a controller that controls an interval between the liquid crystal discharged from the nozzles, with the controller making the discharge unit discharge the liquid droplets from the nozzles. However, in order to function, the device must have such a controller, controlling the motion of the nozzles relative to the substrate and the rate of discharge of the droplets.

In the opinion of the examiner, the remaining claim limitations are functional limitations related to the intended use of the discharging device, rather than structural limitations of the device.

First, the claim recites that the interval is based on a diameter of liquid droplets after impact of the liquid droplets on the substrate, which was measured in advance. This is an intended-use limitation, in that a device having this structure could be used to discharge liquid droplets in this manner. Regardless of this being an intended-use

Art Unit: 2871

limitation, the examiner notes that *Yamamoto* teaches [see Fig. 7] that when using an ink-jet/nozzle technique, the diameter of the liquid droplets after impact of the liquid droplets on the substrate should be considered, since having droplets too far apart [as in Fig. 7b] leads to separated droplets on the substrate and an uneven coverage of the substrate, for instance. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to use a method in which an arrangement pitch of the liquid droplets is determined based on a diameter of the liquid droplets after impact on the substrate, which would have to be measured in advance (or the teaching could not be applied).

Second, the claim recites that the liquid droplets have the following properties when discharged: each of the liquid droplets has the said weight; and thereby, the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of the plurality of pixel regions, to coat each of the plurality of pixel regions with the liquid droplets, having a joined portion therebetween; and the joined portion of the liquid droplets is located at a boundary of the pixel regions. This is not a structural limitation of the device, but rather a description of the droplets discharged by the device. The recitation that "the controller makes said discharge unit discharge the liquid droplets from the nozzles such that..." does not overcome this difficulty by requiring the controller to have particular structural features, since if a user were to intervene to instruct the device to produce such droplets, the controller would then blindly carry out exactly the recited limitation.

Regarding whether the above device based on *Hsieh* would be capable of carrying out these limitations, *Hsieh* discloses that the liquid crystal arrangement device discharges the liquid droplets from the nozzles such that each of the liquid droplets has a certain amount and shows a droplet being associated with each pixel region [see Fig. 4E, for instance] to coat each of the plurality of pixel regions with the liquid droplets. Also, as shown in Fig. 7 of *Hsieh*, due to the passages [630] through the walls around the pixel regions, there is a joined portion of the liquid droplets which is located at a boundary of the pixel regions. It therefore appears quite reasonable that the above device would be capable of carrying out the intended-use limitations if so directed.

Considering the limitation of claim 22, *Hsieh* appears to disclose aligning each impact location of the liquid droplets with each location of the pixel regions (if not, this would have been an obvious matter of optimization). However, *Hsieh* does not disclose a drive system for moving the nozzle and the substrate relative to each other (*Hsieh* shows only a cross-sectional slice of its device, and is silent on how the entire substrate is covered). *Yamamoto* discloses [see Figs. 6 and 7, for instance] an inkjet device with a plurality of nozzles [Fig. 6] as shown in *Hsieh*, which covers the entire substrate by being moved by a drive system [inherent in Fig. 7]. It would have been obvious to one of ordinary skill in the art at the time of the invention to use such a drive system in the device of *Hsieh*, motivated by the desire to use a single small set of nozzles to efficiently and flexibly cover substrates of varying sizes.

Claims 20 and 22 are therefore unpatentable.

5. Claim 28 is rejected under 35 U.S.C. 103(a) as being unpatentable over *Hsieh et al.*, U.S. Patent No. 6,867,840 in view of *Hashizume et al.*, US 2002/0062787 and *Yamamoto et al.*, Japanese Patent Document No. 09-138410 as applied above, and further in view of *Yamamoto et al.*, US 2004/0201818.

Yamamoto '818 discloses [see Fig. 5] a ink-jet nozzle system in which the nozzles are controllable (by a controller). It would have been obvious to one of ordinary skill in the art at the time of the invention to use such an ink-jet system, motivated by the desirability of being able to control the nozzles to turn on and off.

In the device and method discussed above, liquid is dropped from all the nozzles shown in *Hsieh* and *Yamamoto*; alternatively stated, the arrangement pitch is obtained by selecting all the nozzles, and the nozzles have a pitch equal to the arrangement pitch, among the plural nozzles. Similarly, the controller controls the interval in part by selecting all the nozzles, as well as in part by selecting the drive speed. The above device and method do not disclose that the arrangement pitch is obtained by selecting a subset of the nozzles having a pitch therebetween equal to the arrangement pitch, among the plural nozzles. The examiner takes official notice that ink-jet heads having a plurality of nozzles, with only a subset of nozzles being activated at a given instant, are well-known in the art [this assertion was not traversed by the applicant, so it is now considered admitted prior art, see MPEP 2144.03]. It would have been obvious to one of ordinary skill in the art at the time of the invention to do so, motivated by the desire to have the flexibility to use an available nozzle head and selecting a subset of its nozzles having the desired arrangement pitch, rather than having to obtain a specially designed

nozzle head having its nozzle arrangement matching the pixel arrangement (which can vary for different devices which would beneficially be manufactured using the same equipment). The controller would thereby control the interval by selecting the nozzles having a pitch therebetween equal to the arrangement pitch, among the plural nozzles. Claim 28 is therefore unpatentable.

Allowable Subject Matter

6. Claims 16, 17, and 27 are allowed.
7. The following is a statement of reasons for the indication of allowable subject matter:

The prior art does not disclose the method of claim 16, in particular the limitations that the liquid crystal is discharged in a form of liquid droplets, comprising discharging the liquid droplets from the nozzles such that: each of the liquid droplets has said weight; thereby, the diameter of the liquid droplets after impact is roughly equal to the arrangement pitch of the plurality of pixel regions, to coat each of the plurality of pixel regions with the liquid droplets having a joined portion therebetween; and the joined portion of the liquid droplets is located at a boundary of the pixel regions. Claim 16 is therefore allowed, as are its dependent claims 17 and 27.

Conclusion

8. Applicant's amendment necessitated any new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Andrew Schechter whose telephone number is (571) 272-2302. The examiner can normally be reached on Monday - Friday, 9:00 - 5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, David Nelms can be reached on (571) 272-1787. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2871

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Andrew Schechter/
Primary Examiner, Art Unit 2871
Technology Center 2800
20 July 2008